**WHAT IS CLAIMED IS**:

1. A reusable self-aligning precision latch, comprising:

a) a latch body for mounting a latch assembly, including an interface cone;

b) a lead screw, coupled to the latch body on one end, that pivots at an interface on the latch body allowing for self-alignment;

c) a drive cam having a plurality of surfaces and positioned on the lead screw engaging a plurality of linkage assemblies such that at least two links are driven;

d) a flexured ball assembly clamped by the plurality of linkage assemblies to the latch body with a pivoting clamp plate such that all clamping forces between the pivoting clamp plate and the latch body are equalized; and

e) a motor for closing and opening the self-aligning precision latch by turning the lead screw to apply and release, respectively, the clamping forces between the pivoting clamp plate and the latch body.

2. The reusable self-aligning precision latch claimed in claim 1, wherein the motor and the lead screw combine to provide controlled movement of a plurality of clamping pawls.

3. The reusable self-aligning precision latch claimed in claim 1, wherein the plurality of linkage assemblies includes a coupler link and a follower link.

4. The reusable self-aligning precision latch claimed in claim 3, wherein a nub on the coupler link is positively engaged on one of the plurality of surfaces of the drive cam.

5. The reusable self-aligning precision latch claimed in claim 1, wherein the plurality of linkage assemblies comprised of a coupler link, a follower link, and a drive cam form a four bar linkage mechanism.

6. The reusable self-aligning precision latch claimed in claim 5, wherein the follower link is grounded upon one of the plurality of surfaces of the drive cam such that a simple lever mechanism remains.

7. The reusable self-aligning precision latch claimed in claim 6, wherein the follower link is driven by the drive cam to apply the clamping forces.

8. The reusable self-aligning precision latch claimed in claim 1, wherein the flexured ball assembly includes:

a) a ball;

b) a floating clamp plate, in contact with the ball, and maintained perpendicularly to an axis of the flexured ball assembly by a compliant member; and

c) a flexure having a retaining flange for capturing the compliant member prior to latching.

9. The reusable self-aligning precision latch claimed in claim 8, wherein the compliant member is selected from the group consisting of an O-ring, a rubber band, and a spring.

10. A method for latching, employing a kinematic, self-aligning precision latch, comprising the steps of:

a) holding the precision latch open in its initial state to provide unobstructed axial and radial ball seat clearances;

b) positioning a plurality of clamping pawls over a clamp plate to fully capture the clamp plate preventing displacement from a latch seat;

c) making contact with the clamp plate with a follower link in a manner as to equalize forces on the clamp plate;

d) applying a force to the clamp plate by effectively grounding the follower link of a four bar mechanism, thereby, forming a simple lever to obtain mechanical advantage at the clamp plate;

e) providing a clamping force on the clamp plate by deforming a coupler link via a cam; and

f) locking the precision latch in its final state with action from a fixed displacement portion of the cam.

11. The method claimed in claim 10, wherein the step of positioning a plurality of clamping pawls over a clamp plate includes combining action of a motor and a lead screw to provide controlled movement of the plurality of clamping pawls.

12. The method claimed in claim 10, wherein the follower link is a part of a linkage assembly that also includes a coupler link.

13. The method claimed in claim 12, wherein a nub on the coupler link is positively engaged on one of a plurality of surfaces of the cam.

14. The method claimed in claim 12, wherein the linkage assembly comprised of the coupler link, the follower link, and the cam form a four bar linkage mechanism.

15. The method claimed in claim 14, wherein the follower link is grounded upon one of the plurality of surfaces of the cam such that a simple lever mechanism remains.

16. The method claimed in claim 15, wherein the follower link is driven by the drive cam to apply the clamping force.

17. A method for constructing a flexured ball assembly, comprising the steps of:

a) providing a ball;

b) maintaining perpendicularly to an axis of the flexured ball assembly a floating clamp plate, while in contact with the ball, using a compliant member; and

c) capturing the compliant member prior to latching with a flexure having a retaining flange.

18. The method claimed in claim 17, wherein the compliant member is selected from the group consisting of an O-ring, a rubber band, and a spring.